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**Interactive Multimedia Instruction for Training
Self-Directed Learning Techniques**

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June 2016

**United States Army Research Institute
for the Behavioral and Social Sciences**

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14. ABSTRACT (<i>Maximum 200 words</i>): This report presents an interactive multimedia instruction (IMI) exemplar developed for the TRADOC Institute for Noncommissioned Officer (NCO) Professional Development (INCOPD) to train new NCOs on effective self-directed learning skills. Army NCOs must often learn new knowledge and skills on their own in the course of their duties, without the benefit of formal schoolhouse training. On this basis, being skilled in self-directed learning may facilitate NCOs' long-term professional development. This IMI exemplar applies point of need tailored-training instructional designs derived from previous research (see Blankenbeckler, Graves, & Wampler, 2014; Graves, Blankenbeckler, Wampler, & Roberts, in press) to the acquisition and refinement of self-directed learning skills. Previous research by Graves, Rauchfuss, & Wisecarver (2012) documenting the strategies and techniques NCOs use to learn on their own across the span of their careers provided the subject content for this IMI exemplar. Additional research is planned for 2016-2017 to refine and validate the IMI research product described in this report with NCOs enrolled in Basic Leadership Courses and Advanced Leadership Courses. The IMI DVD is available in DTIC as ARI Research Product 2016-05.								
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INTERACTIVE MULTIMEDIA INSTRUCTION FOR TRAINING SELF-DIRECTED LEARNING TECHNIQUES

EXECUTIVE SUMMARY

Research Requirement:

Self-directed learning is a process by which individual learners identify and address their personal learning needs (Knowles, 1975). Self-directed learning is common among Army Noncommissioned Officers (NCOs), particularly when they must learn new knowledge and skills on their own during the course of their duties, often without the benefit of formal schoolhouse training (Graves, Rauchfuss, & Wisecarver, 2012). NCOs who are skilled in self-directed learning strategies and techniques are likely better situated to take responsibility for their own career progress and long-term professional development. The Interactive Multimedia Instruction (IMI) exemplar presented in this research product report was intended to support NCOs in developing the knowledge and skills required to engage in effective self-directed learning.

Procedure:

IMI tailored-training design techniques from previous research were applied to design the IMI exemplar (see Blankenbeckler, Graves, & Wampler, 2014; Graves, Blankenbeckler, Wampler, & Roberts, in press). Content for the training was derived from research that documented the self-directed learning strategies and techniques that NCOs have applied in a career-long continuum (see Graves et al., 2012). In the previous research it was found that as NCOs progress in their careers they tend to hone a subset of learning strategies and techniques that are most effective for them as individuals. The expectation is that by exposing early career NCOs to effective strategies and techniques at an earlier point in their careers they will discover and adopt strategies and techniques that are most effective for them.

In the IMI training, five self-directed learning topics are addressed. These include: (a) having the right attitudes and motivations, (b) planning and analyzing the learning situation, (c) seeking information about topics, (d) making sense of what they are learning, and (e) evaluating their learning outcomes. The structure of these topics was validated in previous research in interviews and focus groups with NCOs and by quantitative analysis of the Self-Learning Strategies Questionnaire, which was administered to a large sample of NCOs of all ranks (see Graves et al., 2012).

Findings:

The report describes the development process for the IMI as well as decisions involved in the implementation of the point of need design. The design included elements of both familiarization training and some tailored training techniques. Adaptations were made to the previously reported tailored training model (Blankenbeckler et al., 2014; Graves et al., in press) to accommodate early career NCOs' lack of familiarity with technical aspects of self-directed learning. The IMI was designed to be accessed on multiple occasions and includes both a

structured course of familiarization with self-directed learning as well as navigational enhancements to facilitate later self-selected review of the content.

Utilization and Dissemination of Findings:

The IMI exemplar was transitioned to the TRADOC Institute for Noncommissioned Officer Professional Development (INCOPD) in September of 2014. Additional research is planned during 2016-2017 to address refinement and validation of the IMI content for training self-directed learning skills for Army NCOs and to incorporate additional features into the IMI.

INTERACTIVE MULTIMEDIA INSTRUCTION FOR TRAINING SELF-DIRECTED LEARNING TECHNIQUES

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Interactive Multimedia Instruction for Training Self-Directed Learning Techniques

INTRODUCTION

The Army Learning Model (ALM) supports a student-centered approach to training and education, in which Soldiers are given greater responsibility for their own personal and professional development (Department of the Army, Training and Doctrine Command, 2011). Moreover, the Army has emphasized its continuing need to develop and maintain an agile and capable force in this period of fiscal austerity and downsizing (Department of the Army, Combined Arms Center, 2015). Given this context, interactive multimedia instruction (IMI) is a viable and cost-effective tool to meet Soldiers' individual learning needs when preparing Soldiers for future duties and responsibilities (Graves, Blankenbeckler, & Wampler, 2014; Graves, Blankenbeckler, Wampler, & Roberts, In Press).

The IMI research product described in this report was focused on developing the self-directed learning skills of new Noncommissioned Officers (NCOs), who are just beginning their careers as leaders. Self-directed learning is a process by which individual learners identify and address their personal learning needs (Knowles, 1975). For new NCOs, who are often expected to learn new skills in the course of their duties, being skilled in self-directed learning may be beneficial in supporting career-long professional development (Graves, Rauchfuss, & Wisecarver, 2012).

The development of this IMI utilized findings from two areas of research. The first area concerned research that identified preferred strategies and techniques that Army NCOs have used at different points in their careers to engage in self-directed learning (Graves et al., 2012). The second concerned research that focused on instructional designs that target the learning needs of individual Soldiers (see Blankenbeckler, Graves, & Wampler, 2013; Blankenbeckler, Graves, & Wampler, 2014; Graves et al., 2014; Graves et al., in press). The IMI was intended to instruct early-career NCOs on a variety of self-directed learning strategies and techniques, preparing them to hone these skills in support of their long-term personal and professional development.

The target audiences envisioned for the IMI exemplar are senior Specialists/Corporals (E-4) and Sergeants (E-5), as well as Staff Sergeants (E-6) who are mentoring new NCOs. The self-directed learning skills presented in the IMI are generic with respect to MOS. While self-directed learning skills could benefit all NCOs, the skills presented in the IMI would likely most benefit new NCOs preparing for duties as leaders.

Why Self-Directed Learning for Noncommissioned Officers?

NCOs' path to success has generally depended on key leadership and staffing assignments, which provide them with opportunities to hone their skills and gain experiences needed to prepare them for future responsibilities, assignments, and promotions. Institutionally, NCO Professional Development (NCOPD) courses have been part of this path. These courses—conducted in-residence, with mobile training teams, or through correspondence—have focused on tactical, technical, and leadership skills needed by NCOs as they advance in their careers.

That said, NCOs have always needed to execute tasks that they may not have been formally trained to do (Graves et al., 2012). As Graves et al. noted, NCOs have often “learned the job by doing the job,” engaging in learning that is self-directed. Moreover, self-development is a key aspect of NCOs’ continuum of learning and professional development (Department of the Army, 2015). That is, NCOs who demonstrate initiative in learning on their own may remain competitive with their peers by gaining knowledge and improving their skills. NCO leaders who are skilled self-directed learners may also contribute to an environment that better trains and coaches subordinates, supporting their Soldiers in acquiring and honing knowledge and skills, and achieving professional and personal goals. To support NCOs who are engaging in self-directed learning, the NCOPD system needs to provide training on techniques and strategies NCOs can use when learning on their own. One way this need can be addressed is through IMI.

The content for this IMI research product was selected to provide early-career NCOs with a means to establish essential skills for learning on their own. This includes both attitudes and motivations related to self-directed learning as well as specific strategies and techniques. These strategies and techniques relate to the skills of problem solving (critical, creative, and adaptive thinking), learning (life-long and self-learning specifically), team building (communication and collaboration), and professional competence. While not directly related to a particular NCO core competency, self-directed learning skills support development of all core competencies.

While the IMI we developed is intended for new NCOs, it is not restricted as a one-time course. The learning materials may serve as a resource that NCOs return to from time to time. The IMI can support NCOs in refreshing their learning skills when milestones, such as promotions or new assignments, occur or as their learning needs change over time. It can also assist in determining changes in proficiencies in strategies used, exploration or awareness of alternate strategies and techniques, or to review self-learning resources to help them better structure their learning plans and activities. Finally, the IMI or its contents can be used by senior NCOs to coach and mentor new NCOs on effective self-directed learning strategies and techniques.

Background on the Self-Directed Learning Strategies Content Model

The content selected for this IMI was based on the model of self-directed learning strategies presented in Graves et al. (2012). Graves et al. identified self-learning skills that NCOs use in everyday practice. Successful NCOs (from Specialists/Corporals E-4 through First Sergeants/Master Sergeants E-8) were interviewed in focus groups to collect concrete examples of effective self-directed learning strategies and techniques. A model of NCO self-directed learning was developed on the basis of this data that is described as a five component process. A self-directed learning strategies questionnaire was developed based on this model. The questionnaire was administered to NCOs to identify general learning strategy preferences by rank, military occupational specialty, and duty status component.

Five Part Model of Self-Directed Learning among Army NCOs. The model of NCOs’ self-learning processes described five components. These components were: (1) having the right attitude and motivation, (2) planning and analyzing the learning situation, (3) seeking

information about the topic, (4) making sense of what they are learning, and (5) evaluating learning.

Having the Right Attitude and Motivation. NCOs described being aware of particular beliefs and needs they had that helped them initiate and sustain their learning activities. These included (a) experiencing a desire to know about a topic, (b) being willing to reach out to others in order to learn, and (c) taking initiative to identify and solve problems.

Planning and Analyzing the Learning Situation. This aspect of the self-directed learning experience focused on how NCOs planned, executed, and tracked their learning progress. This component concerned the structure of the learning experience itself, rather than the NCOs beliefs and attitudes about it. These included: (a) identifying what material was to be learned, (b) determining expectations for the learning process, (c) setting learning goals, and (d) establishing priorities for tasks and topics.

Seeking Information about the Topic. NCOs described how they identified, collected, and used information. NCOs described preferences for (a) hands-on learning, (b) being shown what “right” looks like, (c) using personal examples and experiences, and (d) finding the information they need (e.g., locating books or journals in a library or conducting an online search).

Making Sense of What They are Learning. NCOs described how they worked to make sense of what and how they were learning. These included: (a) being aware of their own thinking process, (b) knowing what to do when they did not understand something, (c) challenging/verifying what they believe/know, and (d) making what they learned their own.

Evaluating Learning. NCOs described a need to check their learning progress and outcomes. The following were often described: (a) relying on the NCO network to find out how they were doing, (b) evaluating whether they accomplished their goals and/or completed their tasks, and (c) determining whether they were able to teach what they had learned to someone else.

THE IMI DEVELOPMENT PROCESS

To assure that the approach and delivery of the self-directed learning IMI would have optimal impact, the researchers defined the point of need the training would be intended to address. Point of need was defined in terms of the medium selected for the training being accessible anytime and anywhere and the learning materials being tailored to address the learning needs of the target audience (see Blankenbeckler et al., 2014). While the NCO Corps could potentially benefit from an improved understanding of self-directed learning strategies and techniques, our intent was to focus on the training audience who could derive the greatest long-term benefit from improved self-learning knowledge and skills: new NCOs at the Specialist/Corporal (E-4) through to more seasoned NCOs at the Staff Sergeant (E-6) ranks. That is, early-to-mid career NCOs; early-career NCOs would benefit most from learning the techniques and strategies, and more seasoned NCOs would have a tool to support mentoring early-career NCOs. Defining the audiences’ learning needs up front would assure that training

was targeted to their needs, the appropriate instructional approach was adopted, and the training was delivered in a manner easily accessible to them.

Graves et al. (2012) suggested that as NCOs develop, accrue time in service, and advance in their careers, they increasingly rely on a subset of techniques that are most effective for them individually. In this regard, more senior NCOs, over the course of a career, may develop a preference for a subset of available strategies and techniques based on their personalities and/or career experiences. In short, Graves et al. indicated that senior NCOs seem to have established a core set of personal learning strategies and techniques that are most effective for them. In contrast, more junior NCOs and Soldiers seem less established in their learning strategies and techniques. They are willing to try out many different approaches to learning, although their learning process can be less efficient as a result. Whether the development of learning strategies is approached in a haphazard or a more systematic way, the process can be difficult and take significant time.

Specialists/Corporals (E-4) through Sergeants (E-5) seemed to be the ideal audience to target with the NCO Self-Learning Strategies IMI. Moreover, their immediate supervisors and mentors, Staff Sergeants (E-6), may also benefit from being well-versed in self-directed learning skills. In a career-long context, this group of NCOs may have the most to gain from improved self-directed learning skills. In addition, given the evolving learning preferences that develop across NCOs' careers, this group may also be most receptive to experimenting with new strategies and techniques. While the entire NCO Corps may benefit from the IMI research product, the selection of these Soldiers and NCOs as our target audience allowed for the identification of content relative to their needs, focusing on relevant self-learning situations, needs, and benefits. For example:

- images were selected to depict early-to-mid career NCOs in an activity alone, as the mentor or trainer, or interfacing with more senior NCOs;
- all scenarios depict early-to-mid career NCOs in situations as the protagonists or targets of the event or action; and
- situations, examples, and military tasks depicted are common to early-career NCOs and small unit leaders.

Although we focused on the NCO Corps, we took care to select a broad range of content to include other Soldiers. Content was also selected to emphasize the role that more senior leaders can play in the self-directed learning process of junior NCOs, such as mentoring, role-modeling, counseling, and supportive feedback. The training emphasizes the benefits these actions have to reinforce senior NCOs' position and authority as leaders. Since training and sharing newly acquired knowledge and skills can benefit their own learning as well as the development and learning of their subordinates, our examples emphasized the role and importance of more senior NCOs in the self-directed learning process.

There were four points of focus for the training. First, we intended to provide the learner with a broad overview of self-directed learning. Second, we introduced 28 identified self-learning techniques and provided examples of how to apply them. Third, we provided resources

to assist learners in further developing skills. Finally, we intended that learners would be better able to understand and apply self-directed learning strategies and techniques.

After identifying the target audience and the focal points for the training, the researchers selected an instructional design for the IMI that would best address the identified point of need. Since self-directed learning needs are both situational and individual, the IMI would best support the learner if it assisted them in identifying and addressing their own preferences. The decision was made to focus on an IMI design that emphasized both the *process* and the *conceptual* content related to self-directed learning, and providing some features to individualize the learning experience.

All NCOs in the targeted population were expected to have some background experience of learning on their own. The IMI product was designed to assist NCOs in becoming aware of their current learning preferences in order to make informed decisions concerning how to focus their efforts during training. The materials were designed to identify topics they should carefully attend to when learning. To accomplish this, we turned to a *tailored training* instructional design model that had proven successful in previous research (see Blankenbecker et al., 2014). Figure 1 depicts this baseline instructional design model.¹

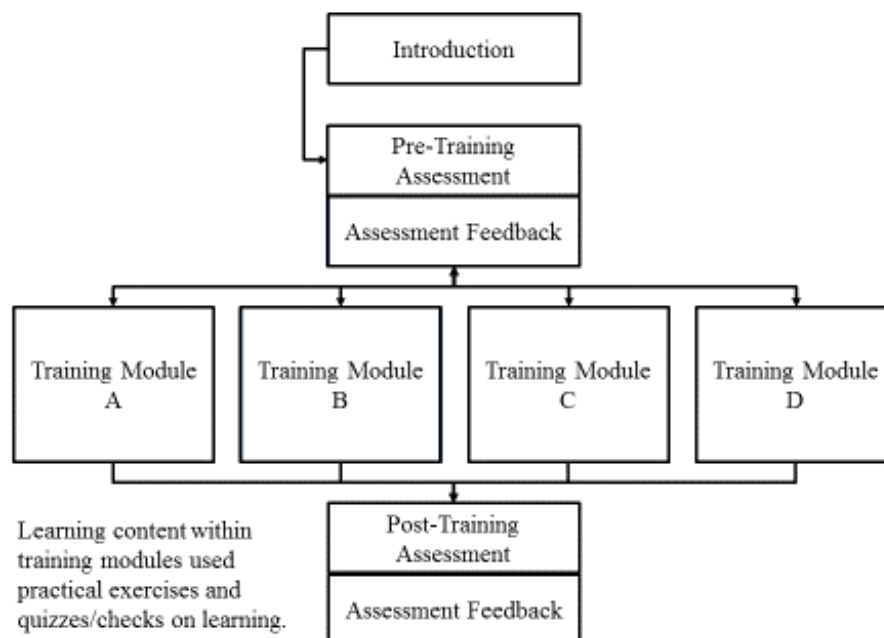


Figure 1. Baseline Instructional Design Model for Tailored Training IMI

In our previous research on tailored training IMI, the selected tasks were those with which the learners already had some experience and familiarity: ‘Adjust Indirect Fire’ and ‘Conduct a Defense by a Squad’ (see Graves et al., in press). In that research, the key feature of

¹ The instructional design model is distinct from the content model discussed earlier. In fact, the instructional design model could be adapted to fit any type of content, whether the content focuses on procedural skills, cognitive skills, or a hybrid of both. See Blankenbeckler et al., 2014; Graves et al., in press.

the baseline tailored training model was that it provided a pre-training assessment with individualized feedback and a navigation scheme that facilitated learners in self-selecting a path through the IMI content. The feedback was designed to help learners develop greater self-awareness of their level of knowledge and skills as well as to identify the portions of content on which they should most concentrate as they progressed through the IMI.

The baseline model used by Blankenbeckler et al. (2014) and Graves et al. (in press) focused on training tasks with precise, objective performance standards. This differed from the tasks involved in developing self-directed learning skills. Self-directed learning skills are developed over time, evolve through experience, and are heavily influenced by learner preferences. In order to adapt the existing model to this particular subject matter, the instructional design for the self-directed learning lessons paralleled several aspects of the baseline model, but exercised the flexibility of the *tailored training* model to achieve the instructional goals.

Initially, the modified instructional design model did not use consolidated pre-training or post-training assessments to examine the steps involved in the whole task. Instead, lessons were preceded by items from the Self-Learning Strategies Questionnaire (SLSQ). SLSQ is a Likert style 23-item questionnaire with demonstrated reliability in previous research, and a content-validated five-factor structure (see Graves et al., 2012). The included SLSQ items were intended to assist learners in assessing their own preferred attitudes, beliefs, strategies, and techniques concerning self-directed learning. The feedback compared individual learners to their peer groups' average responses, using data from Graves et al. (2012) as the basis for comparison. The feedback was intended to increase learners' self-awareness concerning their own preferences prior to more in-depth training and to help them focus their efforts on techniques and strategies they may not have been aware of or to explore more deeply those approaches they already use. Examples of the feedback are provided later in the report. The design of the IMI was a modified tailored-training approach, providing personalized feedback to the learner and a flexible navigation scheme. The navigation scheme was intended to assist learners who were revisiting the IMI to navigate more directly to topics of interest. Figure 2 provides a framework for the initial modifications to the instructional design model.

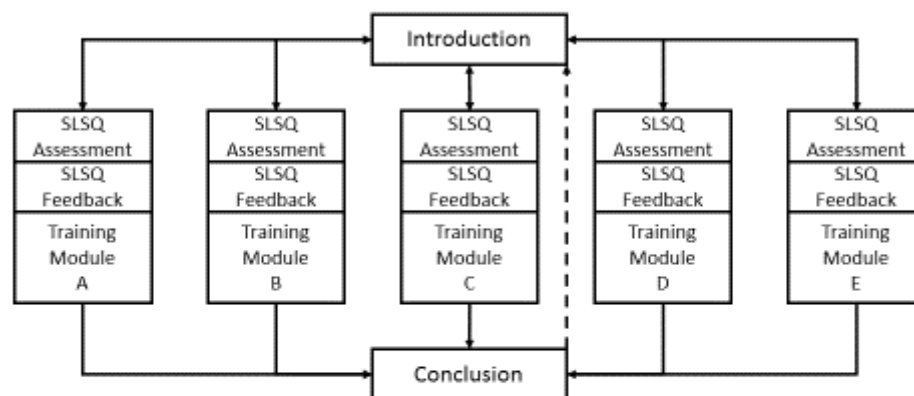


Figure 2. Modified Instructional Design Model Adapted for NCO Self-Directed Learning

Storyboard Development, Review, and Production

After the basic questions of intended audience and general instructional design were decided, a common storyboard IMI development process was used to plan the presentation of content. Microsoft PowerPoint note pages provided a workbench for designing, reviewing, revising, and programming the required elements of the IMI. Figure 3 provides an annotated example of a typical storyboard.

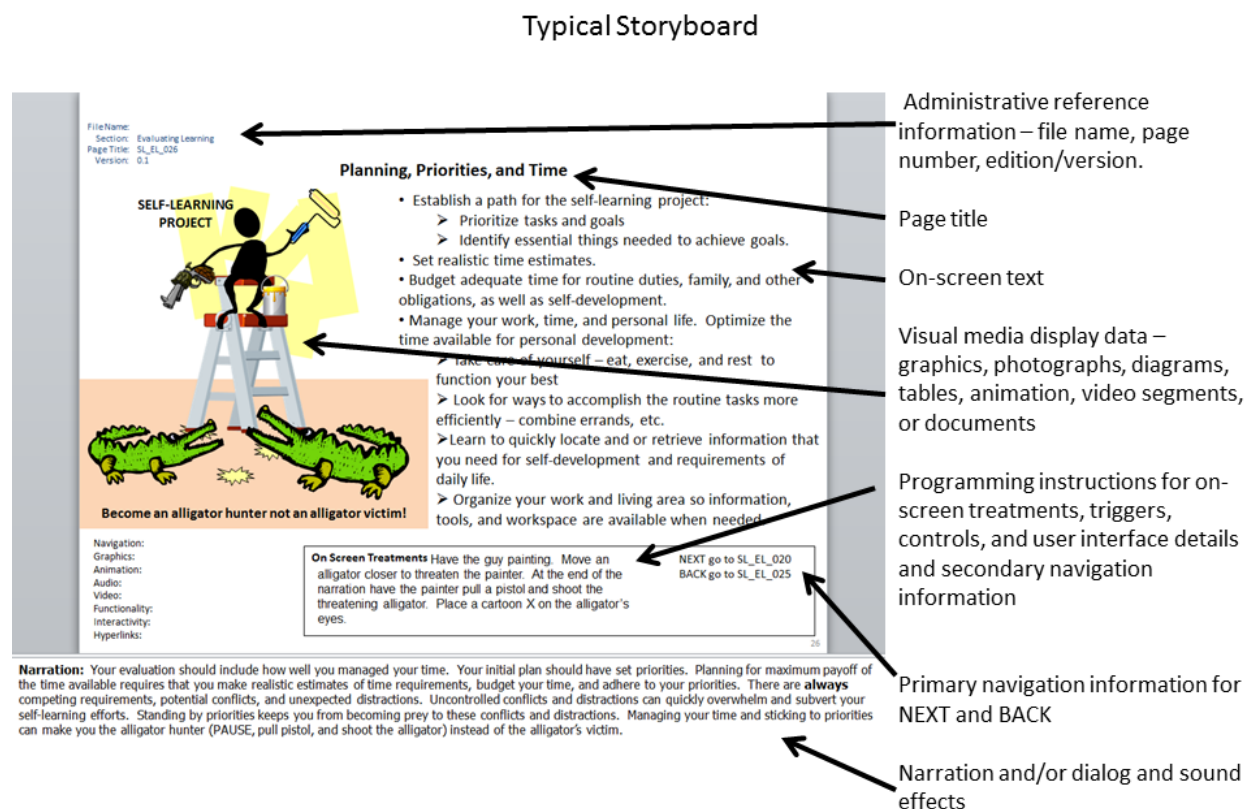


Figure 3. A Typical Storyboard

Using this approach, the note page format can be used to combine the information and graphics from multiple storyboards when complex programming, phased graphics, or complex animations are required. The storyboard generally represents a single unit (page or frame) of the media and provides:

- administrative reference information, including file name, page number, edition/version, as well as information to identify key members of the production staff or principles,
- frame and page titles,
- on-screen text,
- visual media display data, including graphics, photographs, diagrams, tables, animation, video segments, and/or documents,
- programming instructions for on-screen treatments, triggers, controls, and user interface details for actions on the page, including opening associated documents or viewing related (embedded) materials and examples,

- primary navigation information for forward progression or returning to previous pages,
- secondary navigation information for automatic, conditional, or user-selected options such as branching,
- narration and/or dialog and sound effects, and
- guidance to programmers for response scoring or desired feedback from user interface, selections, or actions.

While following a generally accepted industry standard, our storyboard development process was crafted to be in accord with our instructional approach. The team set about developing images and examples to convey the teaching points after selecting scenarios, situations, and examples to convey the self-learning process and practical use of the self-directed learning strategies. When selecting images, care was taken to use or modify images to always portray Soldiers and NCOs as military professionals. Additionally, images were selected to appeal to a diverse audience and provided consideration to race and ethnicity, active and reserve component, gender, and varied military occupational specialties.

We developed storyboards to layout complementary visual media, on-screen text, narration, and sound effects. To maintain an appropriate pace for learners within the IMI, narrations were limited to 20 seconds or less, with rare exceptions lasting up to 30 seconds (Blankenbeckler et al., 2014). Some conversations between scenario characters were longer; in these instances, on-screen images were changed to alter the perspective for the learner and convey the impression of a dialog between Soldiers. The conversation style, idioms, and military-specific language were scripted to convey the appropriate exchanges that the military learner would expect given the situation. For economy, synthetic voice was initially used for most narrations.² However, live voice narrations were used for scenario dialogues and mentor interventions to enhance the realism.

On-screen text was generally limited to no more than one-third (1/3) of the display area, with a true font size appearing as 12 point or larger on the screen (Blankenbeckler et al., 2014). However, when some full-text examples were required for lists or details of Warrior/Leader Task elements, scroll bars were provided to allow the learner to scan and examine the entire document or text. Images and diagrams were designed to be clear to Soldiers with normal vision, but more importantly they were selected to support the teaching point.

All images were selected for a specific purpose. Photos depicted Soldiers engaged in actions related to the teaching point, or a scene that clearly demonstrated the teaching point. Military graphics, when used, depicted standard or common military map symbols and graphics. Less common symbols and graphics were explained. Minor alterations were made to images and supplemental graphics to support teaching points. These alterations included removal of rank and insertion of appropriate rank, removal of in-scene objects or people, and airbrushing of tattoos. When appropriate photographs could not be located, a controlled sequence was desired, or a specific scene, pose, or individual was required, Virtual Battle Space 2 (VBS2) software was used to build the scene and capture the image. For example, VBS2 was used to provide a video of an A-10 airstrike against hostile armor to convey a teaching point.

² Sections that used synthetic voice have been targeted to be updated to live-voice narration in subsequent research.

The team used a multi-phased process to review and approve the storyboards for programming. First, the developers assembled and constructed the storyboards, which were subjected to an internal review. This initial review was to ensure accurate content, transition, flow, and suitability. Suitability for and acceptance by the target audience was a point of major concern. A retired Army Command Sergeant Major with recent active duty experience in deployed Infantry units, who had personally directed his units' NCOPD program, played the role of chief critic. He ensured that images, scenarios, and examples were both doctrinally correct and portrayed NCOs and Soldiers in a professional, correct, and positive manner.

The internal review took a hard look at the content from the perspective of the junior-to mid-grade NCO (i.e., E-4/Corporals, E-5/Sergeants, and E-6/Staff Sergeants) and modeled true appearances, realistic situations, and behaviors. For example, images had been harvested from official Government sites and sources. Some of these images that portrayed Soldiers in outdated uniforms were not used. Suitable alternatives were inserted. Once the storyboards were approved internally, they were sent for broader review and comment by the team, which included military subject matter experts. Once all members of the team were satisfied with the content and design, the edited storyboards were provided to graphic artists. The artists refined the graphics and text, taking care to maintain fidelity.

The storyboards, graphics, animations, and audio materials were then provided to programmers. After the programmers assembled the materials, a production review was used to assure desired navigation and functionality. The *alpha* version of each IMI module was returned to the developer for review to assure correct translation of intent, compliance of the graphics with desired appearance, and navigation/reaction of the software. Once initial revisions were made, the alpha version IMI was again reviewed against the list of corrections and edits determined by the development team. Any final corrections and edits were provided to the artists and programmers. The corrected copy became the *beta* version, which was returned to the developer for a similar review and comment process. This cyclic, iterative review was intended to assure a quality product for the learners.

STRUCTURE AND CONTENT OF THE IMI

What to Expect When Navigating the IMI

The training modules were organized around the set of five learning techniques that the previous research indicated were closely aligned with central themes in NCO self-directed learning experiences (Graves et al., 2012). Figure 4 provides an overview of the basic organization of the lessons.

Leg Up on Self-Learning: Strategies for Success

Wire Frame of the Lesson Organization and Content

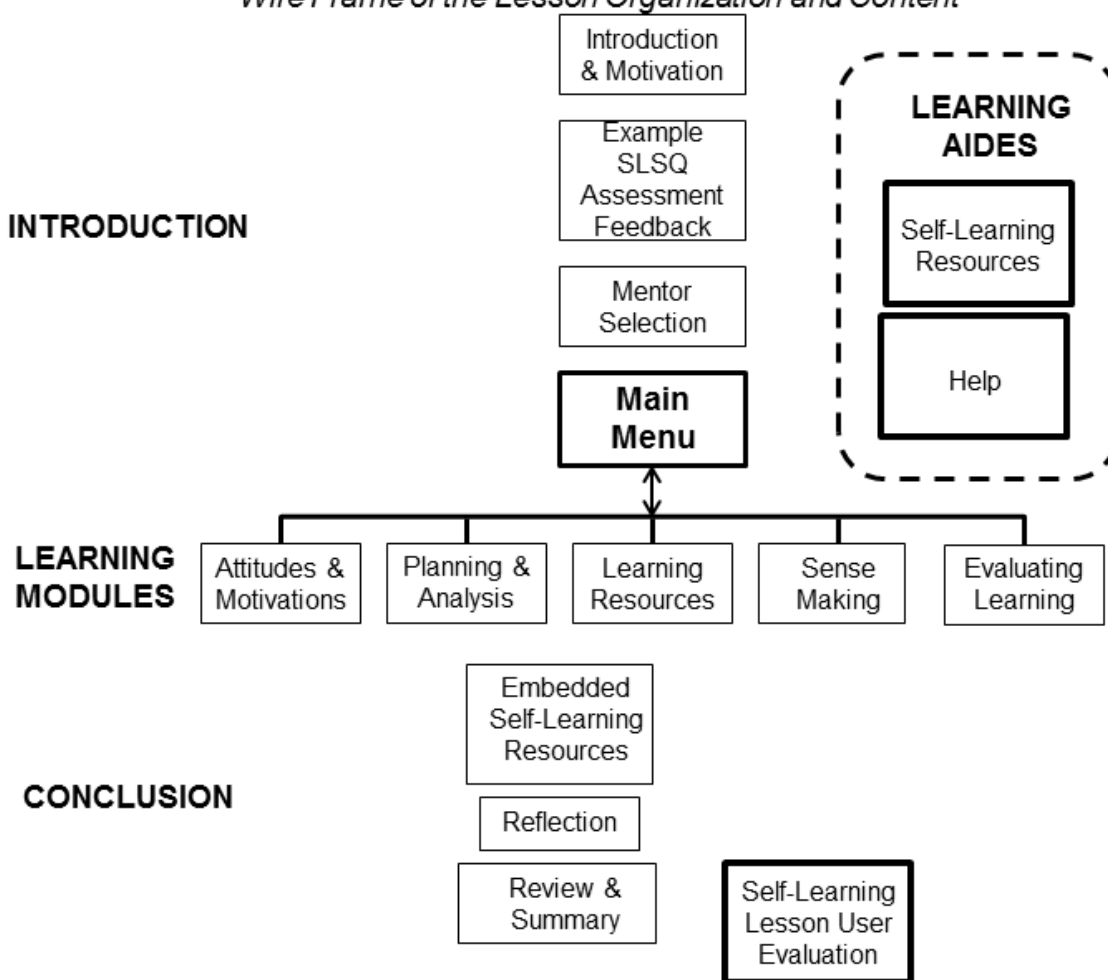


Figure 4. The IMI Lesson Organization

The five topic areas focused on various aspects of the self-directed learning process. The content introduced the concepts associated with particular techniques, and then provided examples of how to use the techniques in the context of military life, duties, and common situations and challenges. This approach moved quickly from the more theoretical content to providing practical illustrations familiar to the target audience. While new learners are encouraged to use the menu from left to right, more experienced learners could use the MENU button to navigate to the Main Menu (see Figure 5). From the Main Menu learners can access any module, allowing for more individualized navigation through the IMI. Figure 5 depicts the Help frame that shows the navigation instructions.

Help

The **Getting a Leg Up on Self-Learning: Strategies for Success** course provides a wealth of information regarding how to design and implement your own self-learning plan. Each module in this course includes a menu like the one shown on this page. You must visit every page within each lesson to complete the course.

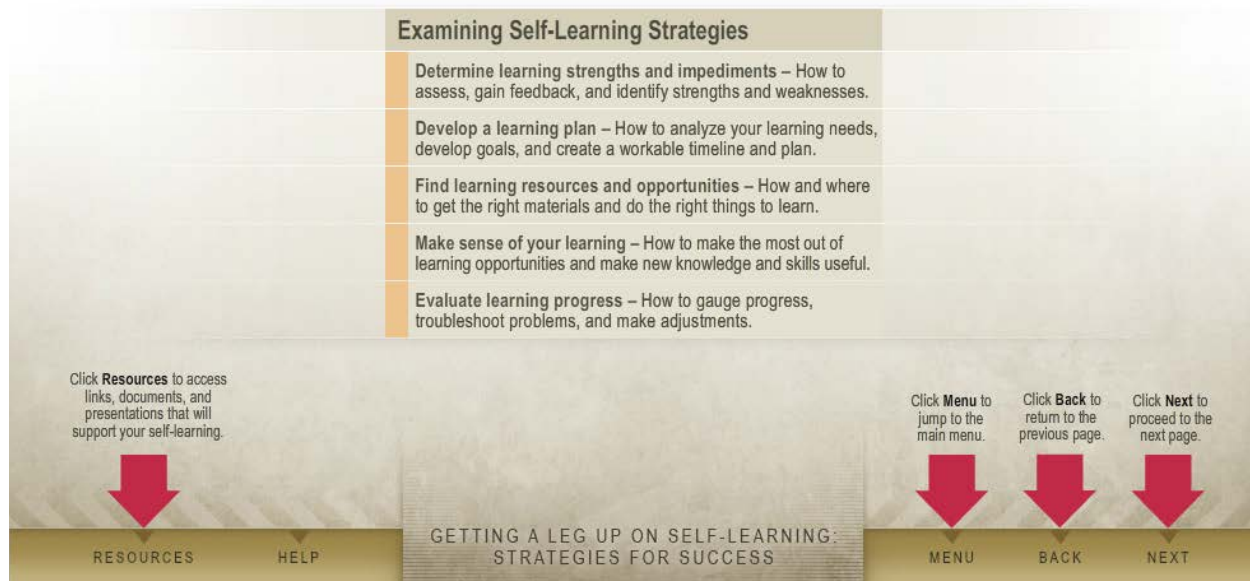


Figure 5. The Help Frame Provides Navigation Instructions

In addition, there were three pages containing learning aides and tools, and a user evaluation. Each of these pages was intended for a specific purpose and includes:

- *Help* – a quick help page to provide learners with assistance concerning the functions and navigation of the IMI material. A Help button or function is common to most IMI programs.
- *Self-Learning Lesson User Evaluation* – a survey link designed to gain user feedback and input on the content, format, and pedagogical approach of the lesson. This survey could be e-mailed to the principal ARI researcher for future improvements in the IMI.
- *Self-Learning Resources* – a link to resources and references for self-learning. This page provides access to documents and web pages that will assist learners with planning, resourcing, and executing self-directed learning. These resources and references include official Army, Veterans Administration (VA), and recommended academic and other documents and sites of interest or value to self-directed learners.

At the Start of the IMI

Introduction. The IMI opens with a brief introduction to provide learners with the context for applying self-directed learning skills for professional self-development in their Army careers. It also highlights the additional resources available to learners as they progress through the IMI. The introductory section concludes with a series of open-ended questions intended to

motivate the learner, including: “How do you set and track your learning goals?” “What techniques work best for you?” “How is your current approach working for you?” Finally, the introduction describes the embedded learning strategy assessment and the how to interpret the feedback it provides.

Selecting a Mentor. Following the introduction, the learner is asked to select among three (3) mentors to guide them through the training. This is meant to reinforce the social nature of self-directed learning in the Army. A picture of each mentor is presented along with his/her biography to show the learner, a new NCO, what experiences and education are typically associated with a successful career as a senior NCO.

Main Navigation Page. After selecting a mentor, the learner then proceeds to the main navigation page. On this page, the learner may hyperlink to any of five main modules within the IMI, covering (1) how to determine learning strengths and weaknesses, (2) how to develop a learning plan, (3) how to find resources and opportunities, (4) how to make sense of learning, and (5) how to evaluate learning progress. At any point within the IMI, the learner can return to this page by clicking on the ‘Menu’ link at the bottom of any page. Learners may also access ‘Help’ and ‘Resources’ from any page within the IMI using the provided links at the bottom of each page.

Content of the Modules

The following describes the topics of the IMI modules in the sequence in which they are initially presented. However, this sequence topics is not the only route learners could take when training. From the main screen, learners may access the content of the five IMI modules in any order.³

How to Determine Strengths and Weaknesses. The content of the first module addresses individual attitudes and motivations that support self-learning by having learners explore their own strengths and weaknesses. This is intended to enable learners to better identify areas for self-development as well as potential obstacles to their learning process. This module is introduced with a young fire team leader (Sergeant) being counseled by his platoon sergeant (Sergeant First Class) concerning the need to prepare quickly in order to compete for an opportunity to move into a soon to be vacant Squad Leader position. The scenario is designed to demonstrate the need to approach self-learning challenges with the proper attitude and self-motivation. The menu branches the user to the four learning topics:

- formulating a self-assessment,
- reviewing formal assessments,
- gathering feedback from others, and
- identifying strengths and weaknesses.

³ As part of our follow-on research and validation efforts (during 2016-2017), a formal diagnostic with learner feedback is being incorporated into the front-matter of the IMI. This will assist learners in self-selecting particular sections of the IMI on which to focus their attention, operating as an additional instructional design feature to support tailored training. The revised IMI will still retain the SLSQ assessment in the introduction to each module.

The module closes with a summary of the strategies presented in the module and provides a printable Self-Assessment Job Aid that learners can use to guide their own self-assessment, enabling them to more clearly determine their self-learning attitudes, strengths, and weaknesses.

How to Develop a Learning Plan. The second module is focused on the planning and analysis phase of the self-learning process. The module is introduced with a fire team leader (Sergeant) being tasked by his platoon sergeant (Sergeant First Class) to prepare for and train aspects of the unit's preliminary marksmanship training. The platoon sergeant desires significant improvement in Soldiers' marksmanship performance from the preliminary training. There is only a short time for the Sergeant to prepare to train others on these skills. The scenario is designed to impress upon learners the requirement to analyze quickly, but thoroughly, what they need to learn in order to formulate a learning plan. Learners are presented with questions from the Self-Learning Strategies Questionnaire to focus on learning strategies that emphasize the required analysis and key elements of a sound, workable self-learning plan. The topic menu branches to information that centers on these task steps:

- determine what to learn,
- establish learning goals and milestones,
- establish a timeline,
- determine (learning) resource requirements, and
- plan for obstacles and impediments.

Further, these topics introduce task analysis in a military context, demonstrate the need to break the overall objective into associated smaller pieces or milestones, and to address the establishment of goals using the acronym SMART.⁴ Topics also introduce the wide variety of resources available. Emphasis is placed on the requirements of time management, prioritization, and the need to maintain flexibility. These topics use examples of the tools, techniques, and strategies in a military small unit context, demonstrating practical application of the strategies, and employing subtle humor to convey teaching points. The module ends with a summary of the strategies associated with self-learning planning and analysis.

How to Find Resources and Opportunities. The third module, focused on information seeking, is designed to address two objectives. The first objective is to introduce associated information seeking strategies and, the second objective is to increase learners' awareness of the vast wealth of learning resources available. The scenario in this module depicts a successful squad leader who is being reassigned to a battalion staff position. He finds out that he knows almost nothing about the duties, procedures, and responsibilities associated with his new job. The self-learning strategy questions asked at the start of the module reinforce the need to locate and identify viable sources of learning material and information.

This module has three central topics focused on identifying good information sources, evaluating and tracking useful sources, and finding opportunities to learn. The first topic on identifying good sources is extensive and focuses on these subtopics: people, books and

⁴ SMART = Specific, Measurable, Achievable, Relevant, Time-bound. This is a standard model of goal-setting often presented in Army literature, such as the *Army Goal Book* (U.S. Army Center for Enhanced Performance, n.d.).

references, as well as courses and courseware. These subtopics are addressed from the perspective of military learners and highlight the vast wealth of existing sources that the NCOs can tap into through Army Knowledge On-line (AKO). Care is taken to highlight the extensive array of books, references, courses, and courseware developed by the Army to improve the skills and knowledge of Soldiers. Embedded resources available in the lesson are included. The module ends with a summary of the strategies associated with information seeking to support self-learning.

How to Make Sense of Learning. An often overlooked aspect of learning, making sense of new knowledge and integrating it into daily life or routine use, is the focus of the fourth module. The scenario introducing this module provides contrasting cases. Two NCOs are studying in their rooms at an Advanced Leaders Course. They are preparing for the next day's in-class practical exercise on troop leading procedures (TLP). One Sergeant is focused on memorizing the steps of TLP. The other is reflecting on tactical situations that he has experienced, applying the steps of TLP, and considering, in hindsight, how his new understanding of TLP would have impacted his planning, preparation, and tactical decisions. The SLSQ assessment follows the scenario, as does a comparison of self-learning execution to the military operations process. Five sensemaking topics form the content of the module, and they range from encouraging the learner to seek out different points of view to challenge or verify learning, to summarizing newly learned concepts and knowledge in the learner's own words. All topics are focused on improving understanding, comprehension, and application of new knowledge and concepts and their integration into the learners' duties. The concept of deep processing (i.e., semantic processing; Craik & Lockhart, 1972) is presented and the module ends with a summary of the strategies associated with sensemaking.

How to Evaluate Learning Progress. The fifth and final instructional module, focused on evaluating learning, is introduced with the question, "Are you really learning?" followed by a scenario depicting a Sergeant assuming the duties of his old squad leader and mentor. The Sergeant expresses his concerns about knowing what he needs to know in order to perform without the guiding hand of his former mentor. The self-learning strategy questions follow the scenario, along with a brief discussion defining methods and techniques that may be used to measure and judge one's progress of learning. The module menu routes the learner to topics that implement the following strategies:

- finding or making opportunities to assess progress,
- using experts for feedback and advice,
- finding opportunities to use and share new knowledge and skills, and
- evaluating how well you achieve learning goals.

The last topic guides learners in using the learning plan as an assessment and evaluation tool to gauge their progress. The topic emphasizes the need to enforce priorities, manage competing requirements, and deal with conflicts and distractions. It employs levity to encourage the self-learner to aggressively eliminate distractions, acting as an "alligator hunter" instead of an "alligator victim." The module closes by emphasizing how to select the best learning resources for the subject matter and individual learning preferences, a review of techniques for determining

learning progress, and a summary of the strategies associated with evaluating progress in self-learning.

Other Resources. While the embedded self-learning resources provided with the IMI are not separate learning modules, they are extensive and were carefully selected to support the self-development and self-directed learning among NCOs. The Resources tab can be accessed from every page of the IMI. The embedded references are not designed to help or assist the learner with a particular subject or task, but to support the self-directed learning process. The Resources page provides access to a variety of documents and websites. For example, the documents section contains Army Regulations and Pamphlets that provide current policies and procedures that outline requirements, provide career and development paths, and furnish information to assist with finding, registering for, and obtaining benefits to help pay for civilian schooling and advanced degree programs. Also available are current Veterans' Administration (VA) pamphlets providing information on education benefits and other documents such as the *Self-Assessment Guide* (introduced in the Planning and Analysis module) and an example of the impact of military and civilian education on administrative points for promotion, i.e., *Sergeant Joe's Promotion Guide*. All documents are furnished in portable document format (PDF) and can be opened, saved, and printed for future use.

The Websites page provides synopses of and hyperlinks to the websites listed. The Department of Defense, Army, and VA websites that are beneficial to self-directed learning are included. Among the sites are the Army Career Tracker (ACT), links to civilian education support agencies, links to doctrinal and training publications, the Army Correspondence Course Program (ACCP), and the Army Training and Education Network, which provides access to existing interactive media courses. The "Unofficial Learning Resources" tab provides links to academic sites dedicated to improving individual study skills, personality and psychological self-awareness assessment websites, and websites providing examples of concept diagrams and mind maps, useful techniques that adult learners may employ to enhance their studies. The Resources tab furnishes a comprehensive list of resources to help the learner get started on or sustain a self-learning effort.

Key Design Features of the IMI

A set of common characteristics were included in each of the modules. Having common characteristics was intended to assist learners in more easily assimilating the content by repeating an organizational pattern with which they would become familiar. Figure 6 provides a model of how content is presented within a typical module.

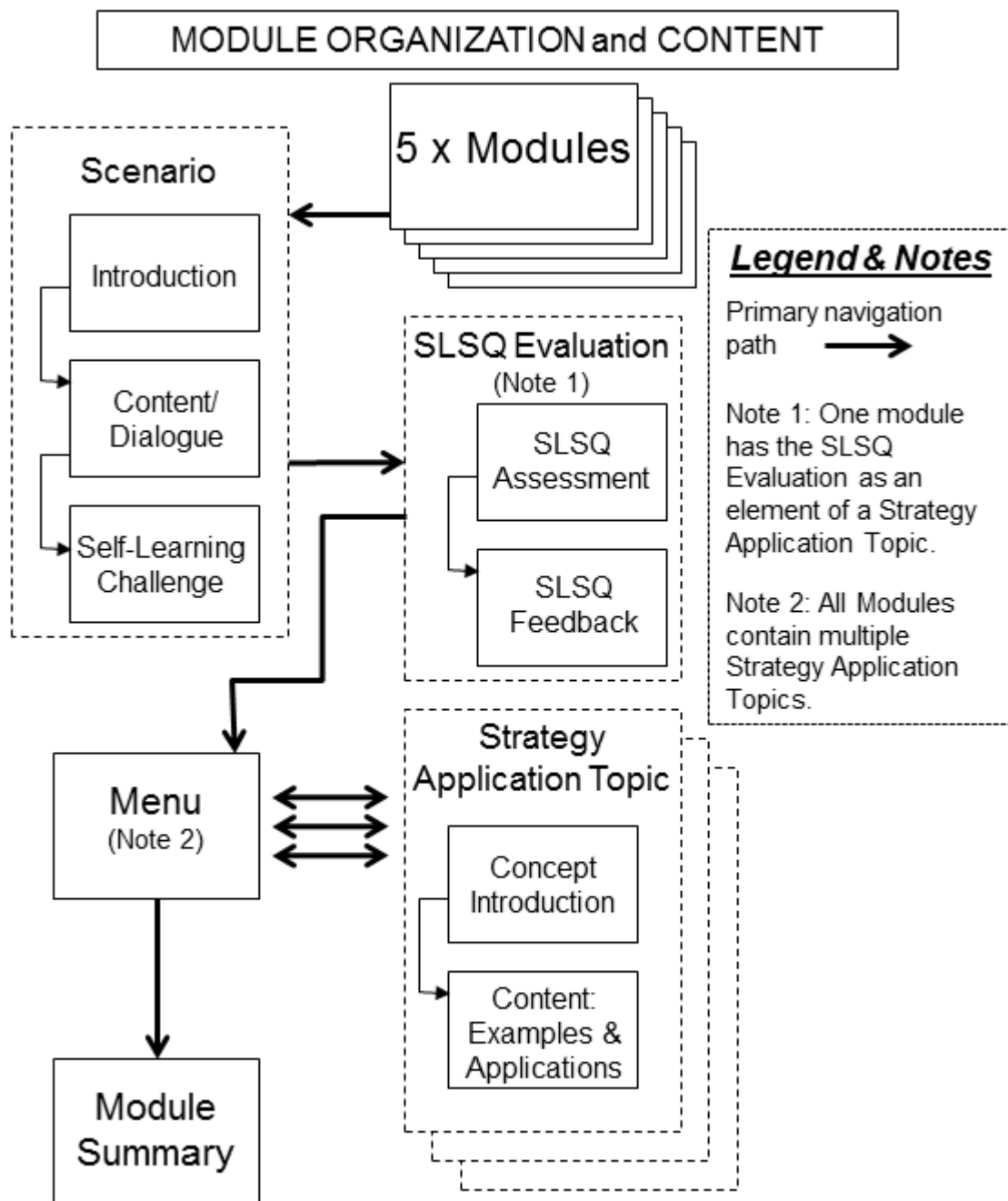


Figure 6. Training Module Organization and Content

Each module is introduced with a realistic scenario that presents common challenges associated with its central theme. The challenges and themes were selected to ensure learners could relate to the content presented.

A self-assessment, targeted to the content of each module, was included in the introductory section of each module to assist learners in assessing their attitudes and strategy preferences associated with self-learning. For less experienced learners, the SLSQ assessment may be their first exposure to particular learning strategies. Other learners may have used a strategy, but may not have considered how it could be applied in a self-directed learning context. In addition, for learners who may be curious about how their responses relate to those of their peers, individual responses are compared to the means for career management fields, rank, time in service, and level of civilian education.

A central menu in each module provides access to the related instructional topics that address each of the learning strategies covered in that module. An experienced learner can use this menu to quickly navigate to topics of interest. The majority of content for each module concerns how to apply the strategies. Multiple topics, three to five per module (21 topics in all), introduce the key concepts of the principal learning strategies and present examples and illustrations of how the strategy can be applied in contexts familiar to the target audience. Examples and illustrations were adapted from vignettes, recollections, and testimonials provided by current and retired NCOs, furnishing a practical application in context and a real-world essence to the training. Common factors among some strategies made it possible to combine them in training, thereby showing how one strategy may complement another. Each module concludes with a summary of the associated strategies for that module. This is intended to remind the learner of the key points that were covered.

Scenarios. The scenarios presented in the training were selected because they are common, relatable events for the target audience. Each of the scenarios are introduced, and summarized at the end of training, by the mentor each learner had selected at the beginning of the training. The situations are designed to be plausible and realistic. Live voice narration was used for scenario dialog to enhance the realism of presented conversations.⁵ For instance, the scenario illustrated in Figure 7 depicts a platoon sergeant tasking a subordinate fire team leader. The fire team leader is tasked with developing and presenting marksmanship instruction prior to a quickly approaching period of gunnery and qualification firing. While the young fire team leader is familiar with the tasks and skills to be trained, he has never trained the skills and may not be fully proficient in them. Like the fire team leader, all principal protagonists in these scenarios are from the target demographic. All Soldiers, IMI users, in the target demographic could have witnessed and many may have experienced similar situations, making it easy to relate to the self-learning challenges posed by the scenarios. For most scenarios, static images with shifts in perspective were used to convey movement and change over time.

⁵ A subsequent research effort (during 2016-2017) to revise and validate the IMI will replace sections with computerized voice narration with live voice narration.

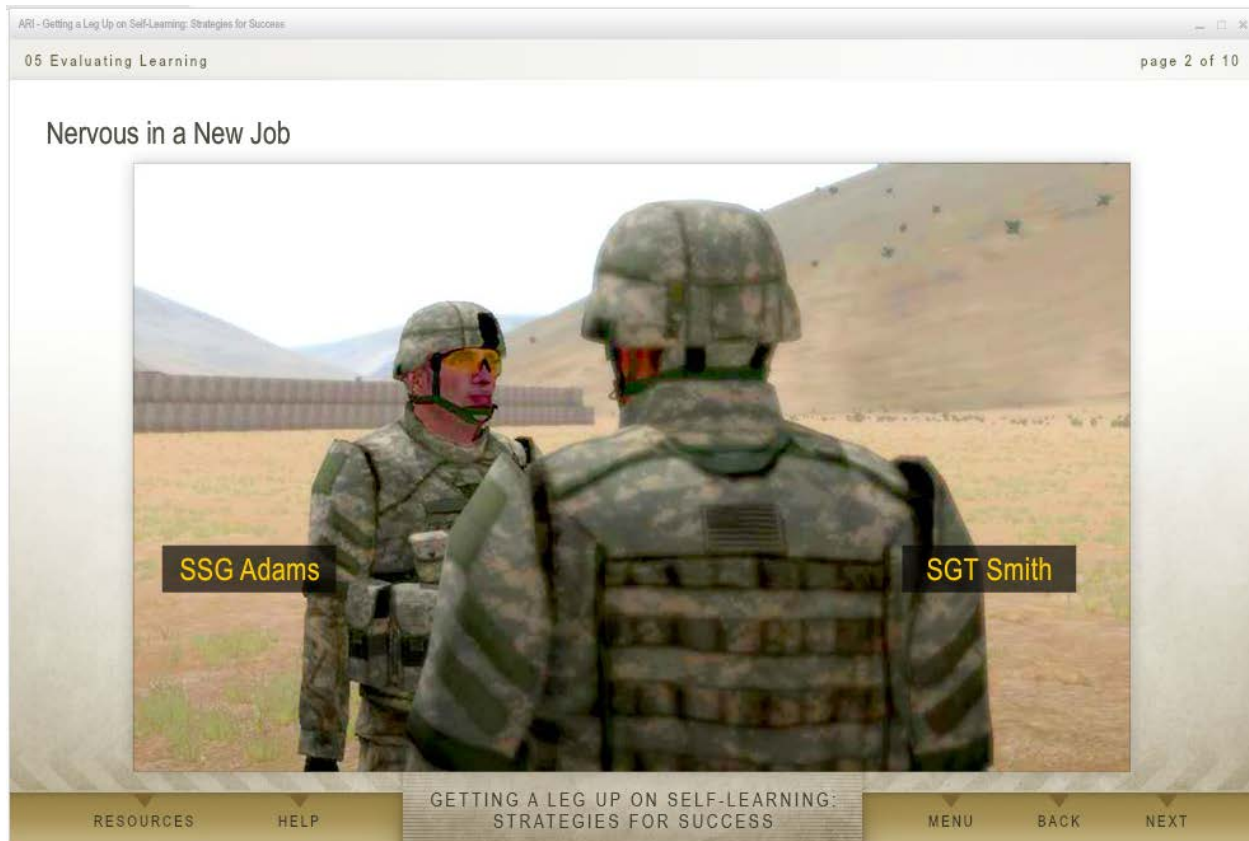


Figure 7. Sample Scenario Image

Learner Evaluation. The SLSQ assessment was intended to provide learners with feedback to increase their awareness of their own attitudes toward self-directed learning and strategy preferences. Figure 8 provides two examples of varied learner selections and individualized learner feedback from one of the modules. The assessment was designed to display learners' assessment rating scores permitting the learners to compare their rating with those of their peers and other NCOs. Feedback was organized in terms of four categories: rank, time in service, civilian education level, and career management field. Through these rating comparisons, Soldiers can self-assess their standing with other NCOs. The accompanying narration encourages learners to build on strengths and address potential shortcomings to maintain competitiveness with peers.

SLSQ Evaluations and Individualized Feedback

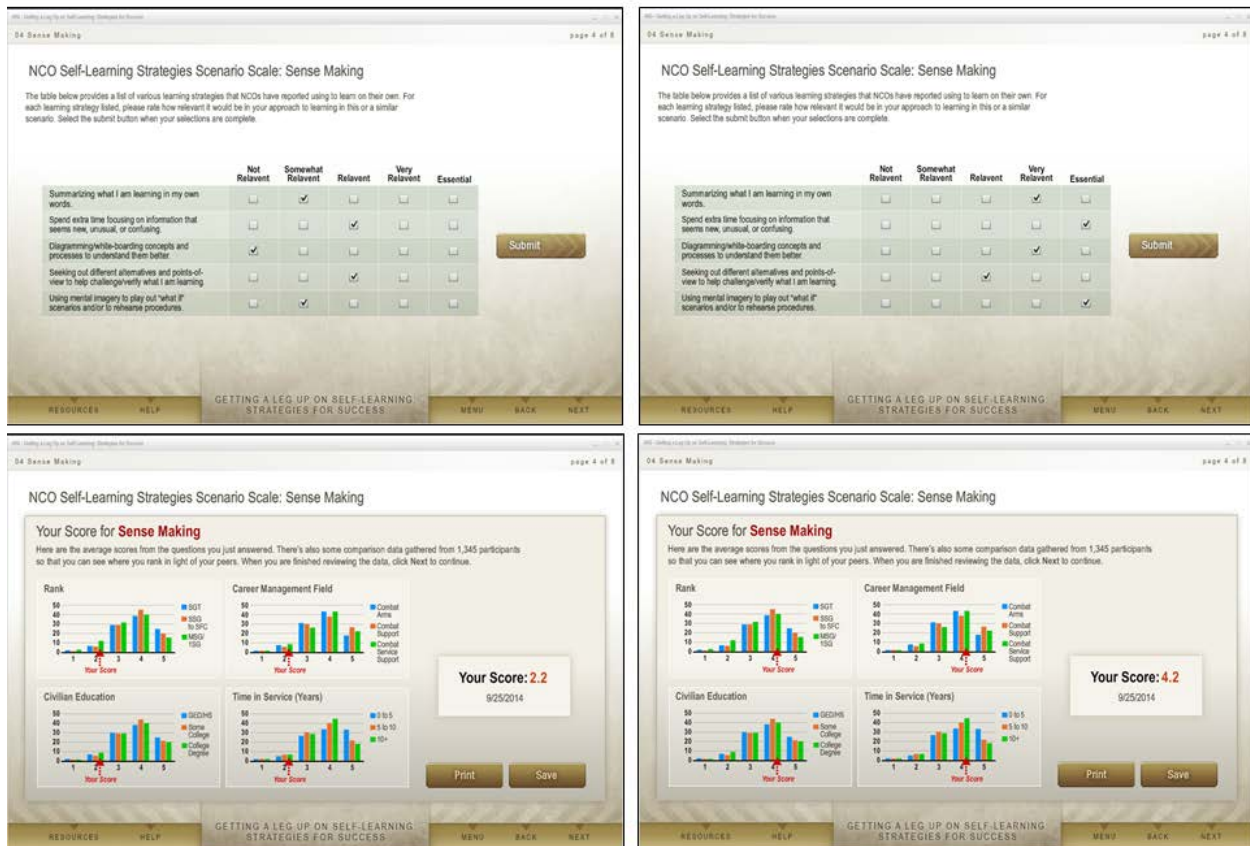


Figure 8. Sample of Individualized Strategy Assessment Feedback

Use of Familiar Examples and Metaphors. The lesson design incorporates metaphors and familiar examples to assist in explaining aspects of self-directed learning. The metaphors use examples from Soldier's Common Tasks, Warrior Leader Skills, and other common associations to address essential concepts and strategies for self-directed learning. These tasks and skills should be familiar to Soldiers across the target training population. Our goal was to furnish these associations with military tasks and skills as foundations upon which to attach self-directed learning knowledge and skills. These metaphors would also provide memory cues, which could be easily recalled as NCOs undertook the duty of guiding their subordinates or peers in self-directed learning. Some examples of the metaphorical relationships and common examples woven into this IMI are identified in Table 1.

Table 1

Metaphorical Relationships and Illustrations Used in Self-Directed Learning Training

Military or Common Example	Self-Directed Learning Concept
<ul style="list-style-type: none"> • “Rose-colored glasses” and distorted mirror images • Tactical planning guidelines and Troop Leading Procedures • Land navigation: moving to an objective using waypoints and frequent compass checks • Painting a room occupied by alligators 	<ul style="list-style-type: none"> • Maintaining awareness of the potential inaccuracies of self-assessments • Checklist for planning a self-learning project • Advancing to a self-learning objective using intermediate goals
<ul style="list-style-type: none"> • Golden key • Juggling dangerous objects on a unicycle • Determining a restated mission for your unit and/or providing a mission brief-back • The progressive process of learning rifle marksmanship or rappelling (mountaineering) • The military operations process 	<ul style="list-style-type: none"> • Planning for distractions while keeping focused on self-learning priorities • Army Knowledge On-Line • Not having a flexible self-learning plan • Summarizing what you have learned in your own words
<ul style="list-style-type: none"> • Gratification derived from video games • Alligators • Heroic historical struggles 	<ul style="list-style-type: none"> • Crawl, walk, run • Tracking execution of a self-learning plan • Demonstrating or teaching new skills to others • Problems that cannot be ignored • Traditions of excellence in NCO performance, leadership, and motivating subordinates
<ul style="list-style-type: none"> • Typical/routine changes to duty rosters 	<ul style="list-style-type: none"> • Need for planning flexibility into self-learning schedules

Figure 9 provides an additional example of the use of common metaphors, the mirror and rose-colored glasses metaphor, to emphasize a key teaching point. The intent of this particular metaphoric image is to stress that self-assessments can be a valuable tool when a self-learner is evaluating attitudes and motivations honestly. This illustration provides some levity while emphasizing the difficulty of self-criticism and seeing one’s faults. Additionally, it helps to illustrate the need to consult multiple sources to increase the accuracy and validity of self-assessment.

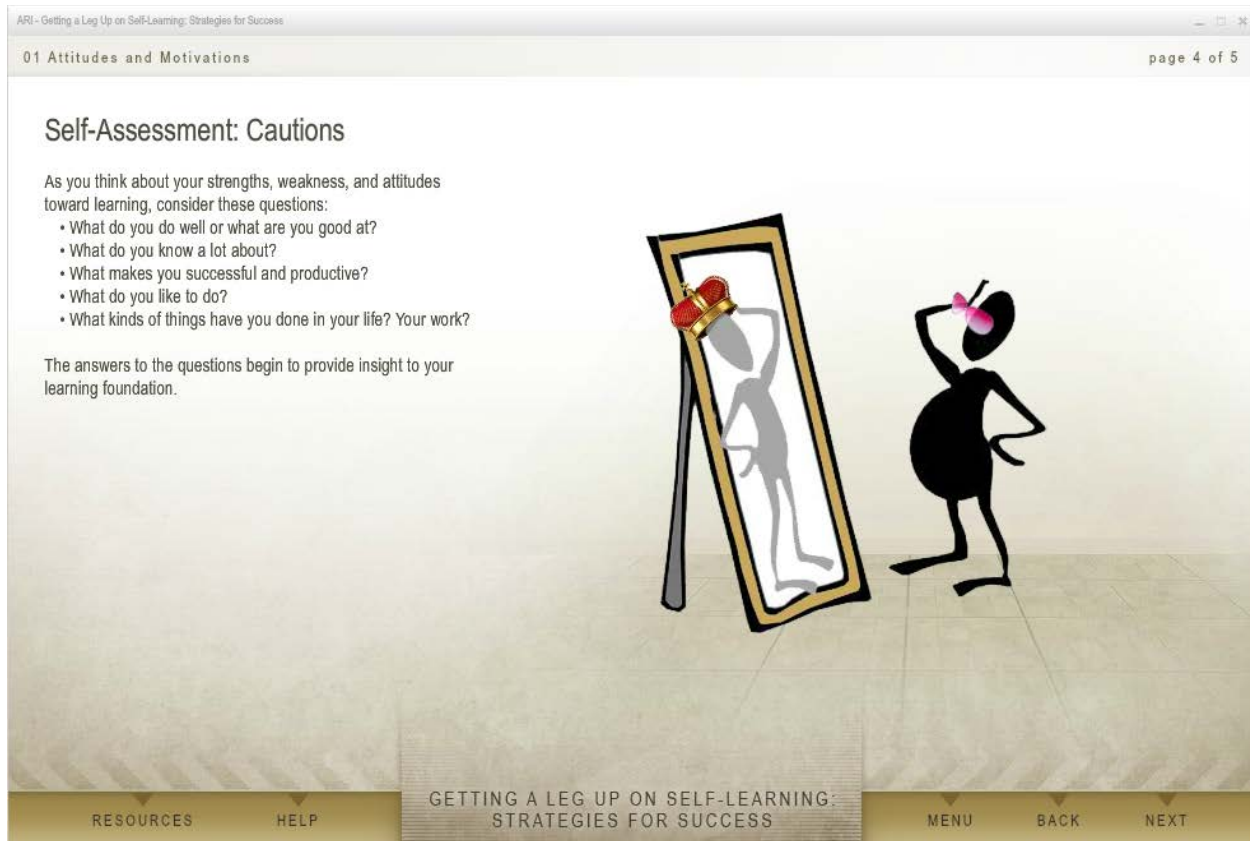


Figure 9. Use of Common Metaphors Emphasizes Key Teaching Points

Figure 10 offers an example of a common situation that most junior NCOs have faced, i.e., a short notice change to a duty roster. This example stresses the need to create a flexible plan for self-directed learning in order to prevent minor inconveniences from derailing the learning process. The illustration uses subtle humor to emphasize the need for flexibility. It also provides a graphic reminder of the need to maintain a written record of the training plan, as well as the need to be persistent in pursuit of training goals.

Planning for Obstacles and Impediments

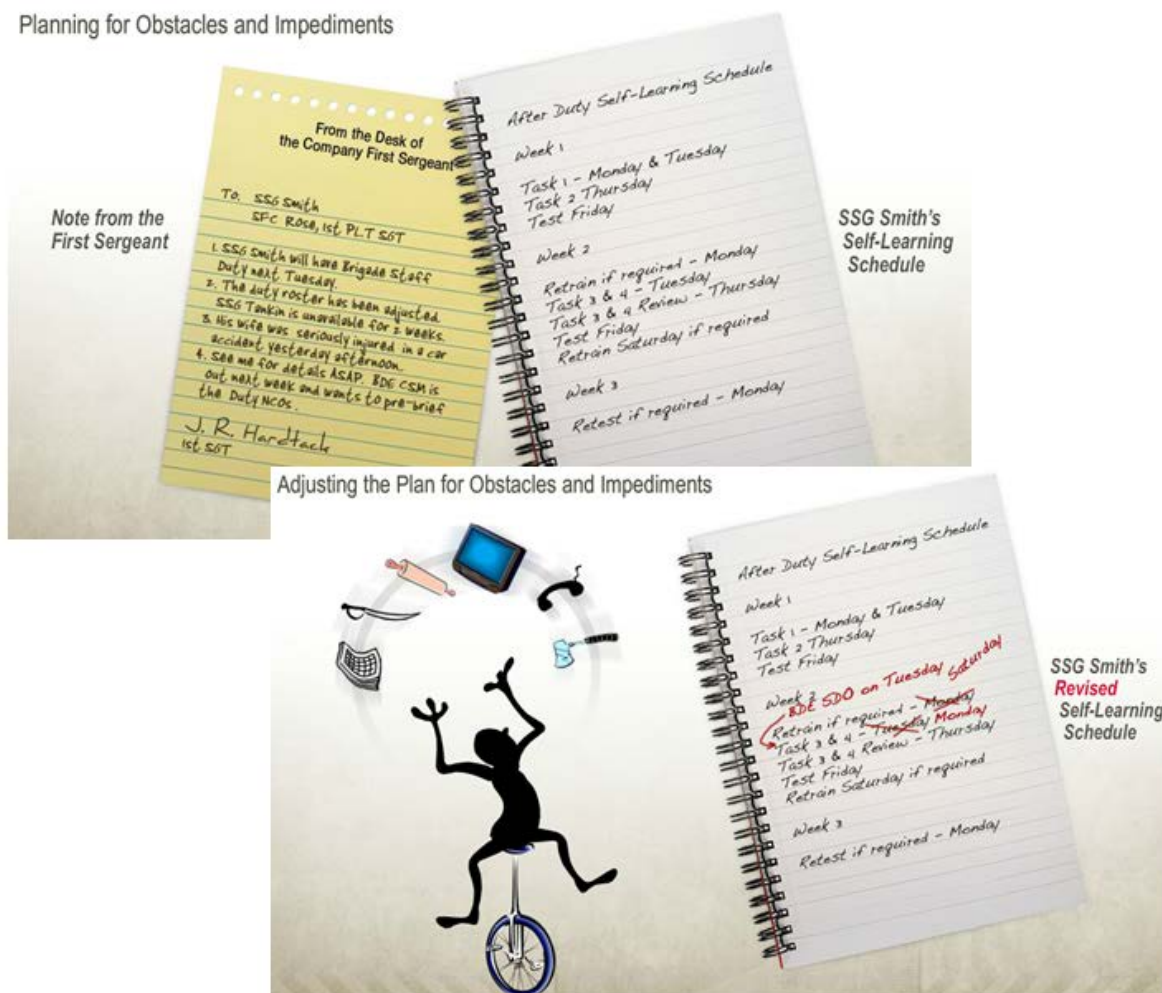


Figure 10. Use of Common Military Situations

Care was taken throughout the lesson to avoid any implication of self-directed learning being a process to be planned and executed in isolation. Maintaining the learning process while also addressing everyday demands is necessary. Images, examples, and narrations stressed the application of strategies in a realistic context. Learners are reminded that self-directed learning would require deliberate planning and prioritizing to avoid conflicts with routine duties, family, other obligations, and the maintenance of health and wellbeing. However, topics addressed also convey to the learner the direct and indirect benefits and advantages of self-learning:

- improving performance with new knowledge and skills,
- sharing new knowledge and skills with subordinates and peers,
- building promotion points for additional Military Training and Civilian Education,
- preparing for military assignments or duties with increased responsibility,
- preparing for the post-Army second career, and
- improving self and attaining personal goals.

Finally, care was taken to appeal to NCOs' professionalism by emphasizing the necessity of maintaining technical and tactical proficiency in common, leader, and MOS skills. Most

NCOs take pride in doing their job well and want to be considered a good leader by their subordinates, peers, and superiors. Examples were designed to reinforce the training and mentoring of subordinates in that it:

- reinforces the NCOs' position and authority as a leaders,
- provides a positive model for developing subordinates and an example for peers,
- improves the skill proficiency and knowledge of subordinates, and
- impacts positively the camaraderie and cohesion of the NCOs' units.

CONCLUSION

This report presented an IMI research product designed to develop the knowledge and skills NCOs require to engage effectively in self-directed learning. Given the emphasis that ALM has placed on increased responsibility for learning and professional development, this IMI may serve to support NCOs in exploring, and/or applying more effectively, learning strategies and techniques to support self-directed learning (Department of the Army, 2011). Given that the strategies and techniques discussed are based on previous research with Army NCOs, the researchers targeted content that has proven effective to NCOs in the past. The sooner that early-career NCOs learn these skills in their careers, the better off they may be as their careers progress and they discover what strategies and techniques work best for them as individuals.

Previous research has indicated that new NCOs may try out a variety of self-directed learning strategies and techniques earlier in their careers, narrowing their repertoire to those that are most effective for them as their careers progress (Graves et al., 2012). On this account, the IMI was not designed to be a one-time course. It was intended to be a reference resource for NCOs to explore and return to whenever they feel the need.

Moreover, it may serve as a resource for NCOs who are more advanced in their careers to identify ways in which they can support the professional development of those whom they are mentoring. Learning strategies and techniques are not one-size-fits-all. Rather than recreate others in their own image, mentors optimally tailor their counseling to the individual needs of the NCOs and Soldiers they support. That tailoring can be a challenging process for mentors. This IMI may provide information NCO mentors can use to assist them in recognizing and addressing the individual learning needs of the NCOs and Soldiers whom they advise. While there is a tremendous volume of materials available as strategies, study guides, and techniques for the adult self-directed learner, few of these resources have targeted Army NCOs. This IMI sought to provide that context for self-directed strategies and techniques, placing them within the context of everyday applications with which Army NCOs will be familiar, and addressing the particular learning needs of this audience.

The design of the IMI was based on a variation of tailored training developed in previous research (Blankenbeckler et al., 2014; Graves et al., in press). In Blankenbeckler et al. (2014), the IMI developed focused on two procedural skills on which learners differed in familiarity based on their Army training and experience. For this NCO self-learning strategies IMI, the researchers assumed the audience had little to no familiarity with technical aspects of the topic domain, although they may have engaged in self-directed learning activities. This assumption

required some design modifications to focus primarily on introductory and familiarization training, with later self-tailoring of the learning experience for content review, etc., supported by navigational enhancements within the IMI. Future revisions to the IMI may seek to improve the interactivity of the learning experience to facilitate more in-depth tailoring to individual learners' needs.

As current fiscal austerity creates additional budgetary restrictions for the Army, Soldiers may come to increasingly rely on self-directed learning earlier in their careers to maintain their life-long professional development. NCOs have long been required to perform tasks on the job that they may not have been trained to do. Being well-versed in strategies and techniques to engage effectively in self-directed learning may support NCOs' long term professional development and effectiveness in the variety of duties and roles for which they are responsible. This IMI was intended to support development of self-directed learning knowledge and skills among Army NCOs.

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Acronyms

ACT	Army Career Tracker
ACCP	Army Correspondence Course Program
ALC	Advanced Leader Course
AKO	Army Knowledge Online
ALM	Army Learning Model
ANOVA	Analysis of Variance
ARI	Army Research Institute for the Behavioral and Social Sciences
CFA	Confirmatory Factor Analysis
E-4	Paygrade designation for Army Specialists/Corporals
E-5	Paygrade designation for Army Sergeants
E-6	Paygrade designation for Army Staff Sergeants
EFA	Exploratory Factor Analysis
IMI	Interactive Multimedia Instruction
INCOPI	Institute for Noncommissioned Officer Professional Development
NCO	Noncommissioned Officer
NCOPI	Noncommissioned Officer Professional Development
MOS	Military Occupational Specialty
SLSQ	Self-Learning Strategies Questionnaire
SLC	Senior Leader Course
SMART	Specific, Measurable, Achievable, Relevant, Time-Bound; mnemonic device to remember characteristics of goals
TLP	Troop Leader Procedures
TRADOC	U.S. Army Training and Doctrine Command
VA	Veterans' Administration
WLC	Warrior Leader Course